

Chemical &
Engineering

NEWS

Major pigment fortunes are not all dark

A Key Chemicals
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Cover: Kerr McGee Chemical's titanium dioxide facility at Hamilton, Miss.

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News of the Week

- **That the expected economic upturn did not occur** is reflected in first-quarter results; of 18 major chemical companies only one had an increase in earnings. **Page 4**
- **Mineral supply** could be the crisis of the 1980s, Federation of Materials Societies tells Congressmen, citing lack of administrator for a minerals policy. **Page 5**
- **Demand for chemical engineers** during the next five years probably will match the number of new graduates entering the marketplace, says AIChE. **Page 5**
- **A laser pulse of 30 femtoseconds** achieved by Bell Labs scientists will enable them to study changes in semiconductor materials with greater precision. **Page 5**
- **Most communities in the U.S. are unprepared** for a chemical disaster, such as a transportation accident, according to NSF-sponsored, four-year study. **Page 6**
- **Unemployment among member chemists** has risen to 1.7% for men, 3.0% for women, data from annual survey by ACS's Office of Manpower Studies show. **Page 6**

Business

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Science

- **Electric signals emitted from living cells** may be related to cellular reproduction and malignancy; electric pulses applied to cells can aid fusion. **Page 20**
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FIRST-QUARTER CHEMICAL EARNINGS TUMBLE

Chemical company executives must be wondering just how bad things can get. Every three months they hear that the turn in the recession is just around the corner, but that turn, like tomorrow, never seems to come.

Thus it seems for the quarter ending last month. The chemical industry was assured last summer that by now the economy would be picking up and the industry would have a spring full of balmy earnings. Instead, companies are being buffeted by results that will make earnings performance in 1981 seem rosy by comparison.

For 18 major basic chemical companies that have reported this year's first-quarter financial data so far, results have been abysmal. Combined sales for the 18 companies declined 6.1% to \$17.0 billion from the first quarter last year. And combined earnings for the 18 companies plummeted 36.2% to \$731 million.

These results are considerably worse than in the fourth quarter of 1981. The earnings drop in first-quarter 1982 was half again as great. Sales had risen a bit in the fourth quarter but fell this time. In all, the numbers bear out that the recession

deepened considerably in first-quarter 1982, even if the rate of economic decline eased from the nosedive pitch of the fourth quarter.

Behind the bottom-line damage companies are now reporting physical business volume, measured by production indexes, was off about 12% this winter from a year ago. That's trouble all by itself but was magnified by price problems. Many basic chemicals and polymers were discounted up to a third or more from list prices. The pricing disaster was far greater than indicated by official government chemical price indexes, which try to reflect real-market discounts but never really catch up.

Combined with still-increasing energy costs, steadily rising wage costs, and sky-high financing costs, the woeful state of prices and production overcame all efforts at companies to tighten the belt and increase productivity. The result is the uniform profits gloom showing up in first-quarter reports.

Of the 18 companies that have reported, only four—Allied, Celanese, Chemed, and Stauffer Chemical—had increases in sales. And as

far as earnings are concerned, thus far, tiny Chemed, spun off from W. R. Grace, shines brightly as the only company with an increase in earnings for the quarter. Chemed's earnings increased 4.2% from first-quarter 1981 to \$5.2 million; its sales rose 2.0% to \$59.9 million.

Two of the 18 companies reported losses for the first quarter. Akzona suffered a loss of \$2.7 million compared to a profit of \$3.3 million in the first quarter last year. Its sales declined 5.9% to about \$291 million. And B. F. Goodrich had an \$18.4 million loss, compared to earnings of \$9.3 million in first-quarter 1981. The company's sales fell 6.6% to almost \$729 million.

Apart from these two companies, the greatest earnings drop percentage-wise for the quarter occurred at PPG Industries, where earnings fell 70.2% from the year-earlier period to \$16.5 million. Its sales were down 7.1% to a little more than \$752 million.

This is not the greatest sales drop among the 18 companies by far. That distinction is held by International Minerals, whose sales fell 21.6% to about \$419 million. IMC's earnings dropped 44.0% to \$23.5 million, which was just the seventh largest drop among the 18 companies.

Union Carbide had the second largest sales decline, 12.4%, to \$231 billion. Its earnings drop of 49.0% to \$90.8 million is the largest decline in terms of dollars among the 18 companies—down \$87.2 million—from year-before levels.

As expected, the economy has been blamed for the declines at almost all of the companies. For instance, Monsanto chairman and chief executive officer John W. Hanley says, "Our first-quarter results reflect the continuing recessionary business environment around the world. The quarter opened with a continuation of the widespread industrywide inventory liquidation process that began in the latter part of 1981. Although our shipments levels improved somewhat as the quarter progressed, they were still below the year-ago levels. With tight inventory controls in place, our operating rates were some 13 percentage points below those experienced during the first quarter of 1981." □

Only Chemed had earnings increase in first quarter

\$ Millions	First-quarter 1982		Change from 1981		Profit margin ^b	
	Sales	Earnings ^a	Sales	Earnings	1982	1981
Akzona	\$ 290.5	\$-2.7	-5.9%	def	def	1.1%
Allied	1614.0	63.0	2.0	-25.0	3.9	5.3
American Cyanamid	845.5	38.0	-4.7	-20.8	4.5	5.4
Celanese	850.0	20.0	6.7	-44.4	2.4	4.0
Chemed	59.9	5.2	2.0	4.2	8.7	8.5
Diamond Shamrock	791.1	29.1	-9.3	-52.1	3.7	7.0
Dow Chemical	2781.0	97.0	-4.0	-46.1	3.5	6.2
Ethyl Corp.	402.7	17.1	-5.3	-19.3	4.2	5.0
B. F. Goodrich	728.6	-18.4	-6.6	def	def	1.2
W. R. Grace ^c	1463.2	79.1	-1.8	-5.3	5.4	5.6
Hercules ^d	640.0	21.9	-4.2	-41.8	3.4	5.6
International Minerals	419.2	23.5	-21.6	-44.0	5.6	7.9
Monsanto ^e	1731.7	147.5	-8.9	-16.2	8.5	9.3
Pennwalt	246.7	5.3	-7.9	-45.9	2.1	3.7
PPG Industries ^f	752.2	16.5	-7.1	-70.2	2.2	6.8
Rohm & Haas ^g	475.3	16.0	-0.7	-41.6	3.4	6.6
Stauffer Chemical	630.3	82.1	0.2	-6.6	13.0	14.0
Union Carbide	2312.1	90.8	-12.4	49.0	3.9	6.7

^a After-tax from continuing operations, excluding extraordinary and nonrecurring items. ^b Net earnings as a percentage of sales. ^c Excludes nonrecurring gain of \$65.1 million in first-quarter 1982. ^d Excludes nonrecurring gain of \$5.3 million, first-quarter 1981. ^e Excludes nonrecurring first-quarter 1982 gain of \$7.6 million. ^f Excludes nonrecurring first-quarter 1981 gain of \$7.6 million. ^g def = deficit.

Recession dulls major pigments' luster

Despite the current downturn, titanium dioxide has makings for some good years ahead; further shakeout will have to come first for carbon black

Fortunes for the two leading pigments are literally black and white. Although their strong tie to auto and housing markets has laid them both open to damage from the current recession, titanium dioxide and carbon black contrast sharply in their underlying health. The white pigment

Key Chemicals

basically is stronger than most other large-volume U.S. chemicals and the black one is much weaker.

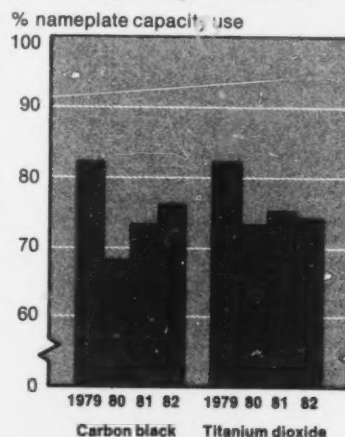
Despite the current downturn, titanium dioxide has several important advantages over most other chemicals. These pluses could lead the dominant white pigment into pretty good performance if the U.S. economy finally can shake off the stop-and-go recessionary pace of the past two years. Even now, titanium diox-

ide has fairly high effective plant capacity use, reasonably stable prices, much improved technology, readily available nonhydrocarbon feedstocks, a thriving foreign trade without too much threat from imports, and little real competition from other pigments.

The same can't be said for carbon black, one of the most woebegone chemicals of them all. Its only advantage is that it got to its present condition years ahead of other chemicals now facing similar problems of maturing markets and excessive investment. Carbon black producers saw their business top out way back in 1974. By 1979, they were ready to bite the bullet. By next winter, they will have shut down one quarter of total capacity in a massive shakeout. Brutal market pressure from customers in tires and autos has forced less efficient producers out of business and chopped prices roughly 20% in just the past year. It's the sort of bloodletting reminiscent of polyester fiber in the late 1970s, although it could lead similarly to brighter business prospects down the road.

But not in 1982 or 1983. Industry analysts view production of both carbon black and titanium dioxide this year down slightly from 1981 with total value unchanged at \$1.8 billion. Next year, production might recover and expand slightly. But the net re-

One quarter of pigments' plant capacity is unused



sult will be a four-year pause in business for these chemicals.

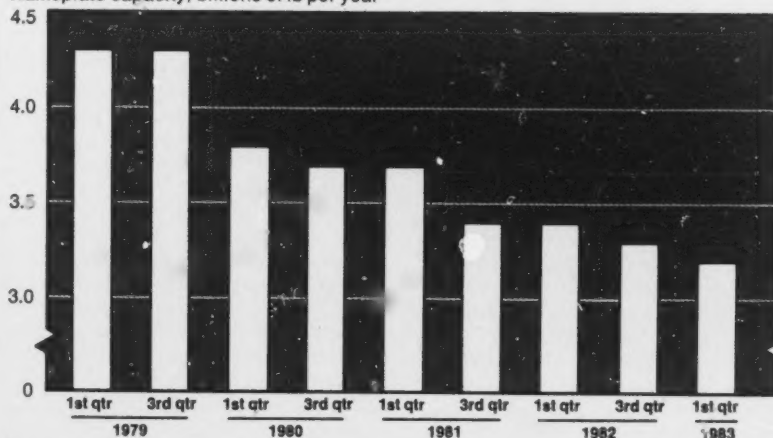
After 1983, the long-term outlook diverges for the two chemicals. Most analysts forecast steady market growth for titanium dioxide, perhaps 2% per year through the decade. For a few years, present U.S. capacity plus some imports could meet demand. But by 1985, U.S. capacity would be pushed to its practical limit of about 850,000 tons per year. Plant additions would have to be in the planning stages now to emerge full blown about mid-decade. As yet, there have been no announcements. Although a supply crunch sounds like a crackpot idea at the moment, it could materialize if a sustained recovery comes to the U.S. economy.

For carbon black, analysts forecast a slow average decline in demand through 1990 with the rate increasing until 1985 and then slowing down. Forces at work will be smaller, longer lasting tires, lighter cars, reduced mileage per car, and strong auto imports with imported tires. Thus, although foreign trade in carbon black itself is small, imports of tires made with foreign-produced carbon black could be an increasing problem. Effectively, U.S.-made carbon black could be losing market share.

Bruce Greek, Houston, and William Fallwell, Washington

Carbon black capacity is one fourth less than in 1979

Nameplate capacity, billions of lb per year



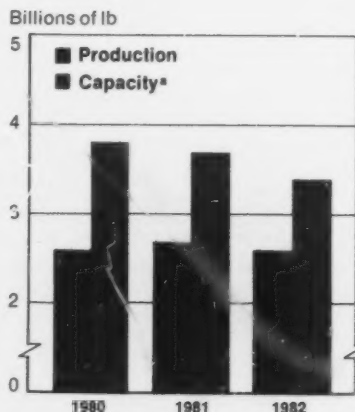
Key Chemicals

C

Carbon black

- **Demand depressed**
- **Plants shutting down**
- **Prices woeful**

PRODUCTION/CAPACITY



HOW MADE

Partial oxidation of carbon black oil (like fuel oil) from refineries

MAJOR END USES (U.S.)

Tires 65%, other rubber products 25%, colorant and filler for plastics, inks, and the like 10%

FOREIGN TRADE

Exports—declining to under 100 million lb, imports—holding at under 25 million lb

PRICES

List price 25 to 35 cents per lb with most at low end; discounting widespread

COMMERCIAL VALUE

\$800 million for production, 1982

U.S. carbon black producers continue trying to get their act together under pretty disheartening conditions. In this shape-up campaign, companies have been shutting down obsolete plants, paring inventories, and holding production reasonably steady. But these actions haven't led yet to one critical improvement needed—picking profits off the floor.

Part of producers' problem is that too many customers know too much about their business. For example, the most important user group down the line, the big auto makers, knows that crude oil prices are declining along with prices of carbon black's feedstock, a heavy refinery fraction called carbon black oil. Detroit wants, and apparently gets, corresponding price cuts in tires. Then tire makers pass the price-cutting pressure back to carbon black. So carbon black prices are reeling, down roughly 20% over the past year. These prices cover quite a range but get as low as 25 cents per lb or less.

So carbon black's low profits will not go away at least until after this year. One sure sign is that producers continue to shut down plants. In 1981, more than 300 million lb per year of nameplate capacity was shut down permanently. Other capacity was closed "temporarily," leading to questions on whether it ever will be restarted. For 1982, more than 200 million lb of capacity might be shut down permanently.

Of course, candidate plants for shut-down become harder to find after a three-year capacity shakeout. The industry will be decidedly leaner after losing fully one quarter of its capacity from mid-1979 through the end of this year.

As 1982 opened, U.S. nameplate capacity for carbon black totaled about 3.4 billion lb, including a tiny amount for thermal-process carbon black. Furnace-process black accounts for all the rest.

Production in 1982 is expected to range from the 1981 level of 2.7 billion lb down to less than 2.5 billion lb for a 10% drop. If production splits the middle at 2.6 billion lb, plants will run at 76% of first-quarter capacity. This use rate would be higher than in 1981, when first-quarter capacity of 3.7 billion lb ran at 73% producing 2.7 billion lb. The

actual operating rate rose during the year as capacity was shut down.

The outlook for 1982 depends heavily on a second-half recovery in U.S. auto production and tire sales. Current guesses are that carbon black production fell off 15% in the first quarter from first-quarter 1981. Industry analysts have noted a small pickup lately, but they predict that second-quarter production also will be lower than in 1981.

So analysts' predictions for 1982 obviously rest on a pickup later. Inventories will play a role. Carbon black inventories are considered minimal for the current level of tire production. Therefore, if tire production surges to fill second-half demand and replenish inventories, carbon black production also might pick up to fill the product pipeline. Such reasons underlie hopes that actual 1982 production of carbon black will about match that of 1981.

Rubber products other than tires account for a quarter of U.S. carbon black demand. Unfortunately, much of this "rubber mechanical goods" also goes to automotive uses. Hence, when auto and truck production weakens, most carbon black markets suffer.

The remaining segments of mechanical goods such as belting are tied closely to the general level of industrial production. When industrial production declines, associated materials-handling functions, which use belts, decline equally.

The smaller uses of carbon black in plastics, inks, paints, and elsewhere have little effect on total demand. The best growth rates will be no more than twice constant-dollar gross national product or 4% per year.

Hence, carbon black really depends on tires for the major shifts in its use—a prospect not very encouraging at the moment. Since tires now have smaller sizes and longer lives in a reduced U.S. auto business, use of U.S.-made carbon black might be flat or falling longer than producers would like to think.

The only consolation for producers is that they have acted decisively and early in this recessionary period to adjust capacity to the new market reality. Although painful, these moves will shorten the time needed for business to brighten again in any sustained general economic recovery.

Key Chemicals

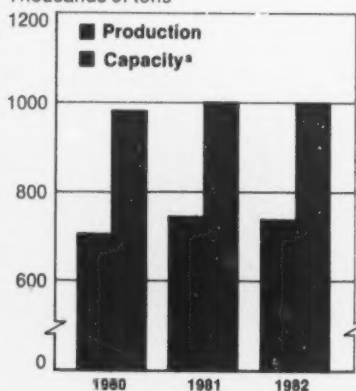
Titanium dioxide



- **Production easing**
- **Capacity flat**
- **Prices a bit soft**

PRODUCTION/CAPACITY

Thousands of tons



■ First quarter.

HOW MADE

Recovered from natural or synthetic ores using chlorine or sulfuric acid

MAJOR END USES

Hard-surface coatings 50%, paper coatings and fillers 25%, plastics and rubber fillers 15%, ceramics 5%

FOREIGN TRADE

Exports—expected up, to 70,000 tons in 1982; imports—also up, to 110,000 tons in 1982

PRICES

Anatase form 69 to 70 cents per lb; rutile form 75 cents per lb; modest discounting

COMMERCIAL VALUE

\$950 million for production, 1982

U.S. titanium dioxide producers can't boast that they are immune to the present recession, since they have large markets in auto and house paint. But they can feel fortunate. In output, plant use, price, foreign trade, technology, and raw materials, titanium dioxide is faring far better than most other large-volume U.S. chemicals. If recovery ever arrives for the U.S. economy, the white pigment could be well off in a year or two.

However, for 1982, titanium dioxide faces stagnation after a better than expected 1981. This year, production likely will be down slightly. Plant capacity will be flat. And even with list prices up a bit from a year ago, profitability will be marginal.

Industry analysts familiar with this pigment think that 1982 production probably will total 740,000 tons, off slightly from just over 750,000 tons in 1981. Total U.S. use will be higher than production again because of imports and an inventory drawdown. Use this year is expected to be about 775,000 tons, down from about 790,000 tons in 1981.

Titanium dioxide plants' nameplate capacity comes to just over 1 million tons per year. Actual sustainable capacity is a controversial matter but is much less than nameplate. Estimates of effective capacity range from 820,000 to 880,000 tons, with opinion weighted toward the lower end of the range considering today's rough economic conditions.

Behind the relatively large downgrading for effective capacity are technical limits to production due largely to the switchover time necessary to make the variety of product grades. These grades have two basic crystal forms corresponding to the two basic raw materials, anatase and rutile. Although efforts are under way to develop finished forms that can be used in more diverse products, some forms always will be limited to certain final uses, especially in the dominant coatings market. Hence, effective capacity will continue to be a lower fraction of nameplate capacity than is the case for many other chemicals.

If the resulting effective capacity is 850,000 tons, the effective operating rate for 1981 would have been 88%.

(Use of nameplate capacity was 75%.) If effective capacity is as low as 825,000 tons, the effective 1981 use rate would have been 91%, quite decently high.

This year the effective plant-use rate might be off a bit to 87%, assuming effective capacity holds at 850,000 tons. At an effective capacity of 825,000 tons, the plant-use rate still would be a healthy 90%.

But even with such respectable operating rates, no one in the industry has good profitability. Clear evidence is the dearth of announcements of new plants or expansions. Capital investment in a titanium dioxide plant is said by industry analysts to be one of the highest of all large-volume chemicals. So investment will "hesitate" for the pigment even when capacity use is high if current return on investment isn't very good.

The basic problem for titanium dioxide producers is a common one—product maturity, which lays the pigment open to the ups and downs of general business cycles. This year is a good example. Total use of titanium dioxide will fall 2% this year because of the depressing influence of the gross national product.

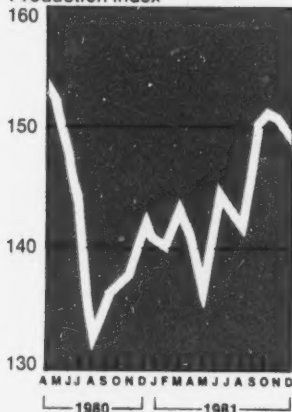
Paint, which accounts for just over half of titanium dioxide use, was off in volume in 1981 and will be off again in 1982. The decline of titanium dioxide content in trade sales (retail) paint apparently has about ended. But efforts to improve paint quality, including use of more titanium dioxide, haven't gotten off the ground. As a result, the dominant use of titanium dioxide will follow GNP with little new market penetration for at least another year.

Use of titanium dioxide in paper and fabricated plastics accounts for most of the other half of total use. These uses had their ups and downs in 1981 and will have more in 1982. Net prospects for titanium dioxide for these uses in 1982 are about the same as in 1981, assuming the economy improves in the second half.

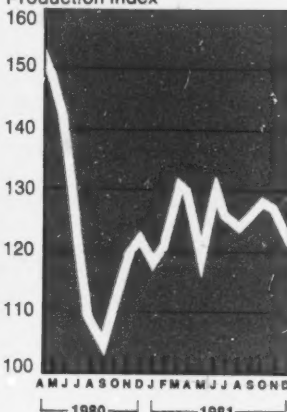
Unfortunately, a second-half upturn in the economy would come too late for paint because trade sales have their seasonal peak in the second quarter. Such unfortunate timing helps confirm that 1982 probably will be no better than a holding period for titanium dioxide.

Japanese chemical recovery still heavy going

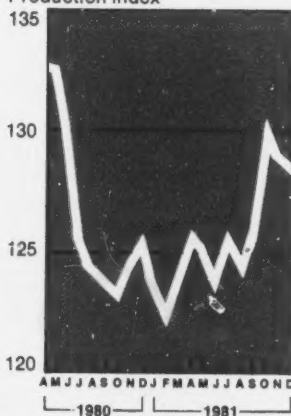
All chemicals
Production index



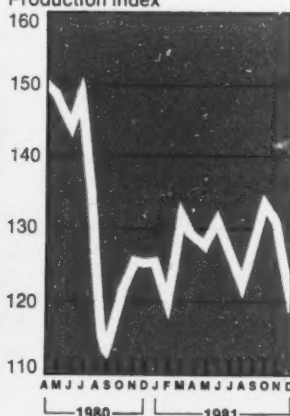
Petrochemicals
Production index



Synthetic fibers
Production index



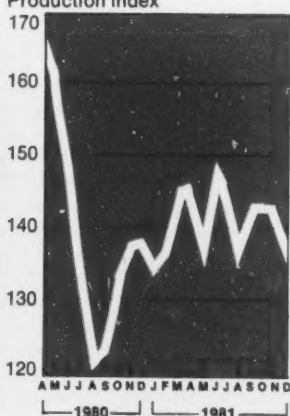
Synthetic rubber
Production index



Fertilizer
Production index



Plastics
Production index



Note: Base year for all indexes, which are seasonally adjusted, is 1975 = 100.
Source: Ministry of International Trade & Industry

Among Japanese chemical executives, 1981 won't be remembered fondly as one of those banner years. More than likely, 1982 won't be, either. The Japanese chemical industry, particularly the all-important petrochemical segment, has been—and still is—in big trouble.

Realistically, it took Japanese petrochemical producers more than five years to recover from what they refer to as "the first oil shock" of 1973. After the industry started to rebound, output climbed slowly but steadily, reaching its peak in fourth-quarter 1979 and first-quarter 1980.

Then, all of the industry's troubles started coming together at the same time. Customers in Japan, burdened with excessive inventory purchased in anticipation of future price increases, stopped buying. Domestic demand dropped. Production followed suit. In fact, it plummeted in the second and third quarters of 1980.

Since then, Japanese petrochemical producers have spent the fourth quarter of 1980 and all of last year trying to recover lost ground. They have succeeded, but only partially. Output still is well below the heights that it enjoyed in late 1979 and early 1980. Now there are signs that even last year's modest recovery may be difficult to sustain, much less improve upon.

The reason, of course, is that the problems that have plagued the Japanese petrochemical industry over the past few years are still there. Its basic weakness is dependence on high-priced naphtha. The industry simply can't compete with petrochemical industries based on lower-cost light feedstocks.

As a result, Japanese petrochemical exports are feeling the pinch. The country has been—and still is—swamped with chemical imports. The ones that hurt most are ethylene derivatives, particularly from the U.S. and Canada. Meanwhile, with domestic demand nothing to rave about, production still is suffering.

Last year's ethylene production, for instance, was only 3.65 million metric tons, down 13% from 1980. That level also is the lowest it has been since 1975.

The Ministry of International Trade & Industry (MITI) estimated that first-quarter 1982 demand for ethylene would be 850,000 metric tons. Final figures for the quarter aren't in yet, but it's unlikely that demand exceeded MITI's forecast.

Indeed, ethylene output in January was only 289,400 metric tons. That's not very encouraging, because a monthly ethylene output below 300,000 metric tons means that producers are operating their plants below 60% of capacity.

The situation likely will improve over the remainder of the year, but not very much. Meanwhile, imports continue to pour into Japan and exports suffer.

To cope with these problems, which are taking huge bites out of company profits, the industry is taking some drastic steps. So-called "antirecession" cartels have been set up for several petrochemical products to adjust production levels. Joint selling companies, such as the one for polyvinyl chloride, are being considered. Antidumping charges have been filed against U.S. petrochemical exports. More important, the industry finally has won some long-sought concessions on naphtha imports and domestic naphtha prices.

Earl Anderson, New York